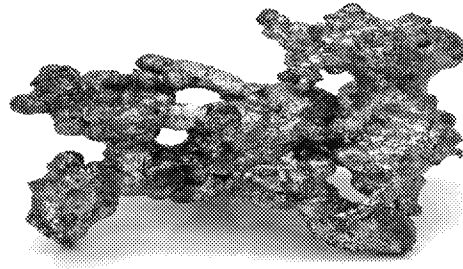


Lead (and Copper) Sampling



Katie Connaughton, P.E.
Division of Drinking Water – Redding Office

Today's Topics

- History of the Lead and Copper Rule & Why it's important
- Flint – What happened and Why
- Lead sampling in California Schools
- Lead Service Line Inventory

Requirement for community systems and nontransient-noncommunity systems to monitor for lead and copper levels in consumer taps. If action levels are exceeded, installation of corrosion control treatment is required. If action level for copper is exceeded, public notification is required.

History of Lead and Copper Rule

- 1986: Congress banned use of lead in plumbing materials
- 1988: Lead Contamination Control Act
- 1991: EPA published LCR
 - Action Levels Established (90th percentile)

Lead	Copper
15 ppb	1.3 ppm

Compliance with the action levels is based on the 90th percentile of lead and copper levels. We can go over this calculation.

90th percentile calculation – 2 ways

*We have a worksheet to help

1. Rounding (in the regulations)
2. Interpolation (can use excel)

Rounding Method

Number of Samples	How to calculate 90 th percentile
1-5 samples	Rank samples from lowest to highest. Average the two highest results
6 or more	Rank samples from lowest to highest. Multiply the number of samples collected by 0.9. This is the 90 th percentile place holder. The result at that place is the 90 th percentile.

Interpolation

$$\text{Rank} = P/100 \times (N - 1) + 1; \text{ or}$$
$$\text{Rank} = P/100 \times (N + 1)$$

P = percentile (90)

N = sample size

- **Selection of Sample Sites**

- Tiering System prioritizing sampling sites

- # of samples based on population (Table 64680-A)

System Size	Standard Tap Sampling	Reduced Tap Sampling
> 100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
<100	5	5

Tier 1: Single Family Residences with lead pipes, a lead service line, or with copper pipes with lead solder installed after 1982

Tier 2: Multi-family residences with a lead service line or with copper pipes with lead solder after 1982

Tier 3: Single-family residences with copper pipes with lead solder installed before 1983

*Over the past 25 years, the number of water systems with a 90th percentile exceeding the lead action levels has decreased by 90%.

Why is Lead a Serious Health Issue?

- Affects the brain and nervous system of children
- Infants and children who drink water containing lead in excess of the action level¹ may experience delays in their physical or mental development. Children may show slight deficits in attention span and learning abilities. Adults who drink this water over many years may develop kidney problems or high blood pressure
- Doses of lead that have little effect on adults, can have significant effects on a child.

In children, low levels of exposure have been linked to damage to the central and peripheral nervous system, learning disabilities, shorter stature, impaired hearing, and impaired formation and function of blood cells.

Lead is also harmful to adults. Adults exposed to lead can suffer from:
Cardiovascular effects, increased blood pressure and incidence of hypertension
Decreased kidney function
Reproductive problems (in both men and women)

What about Copper?



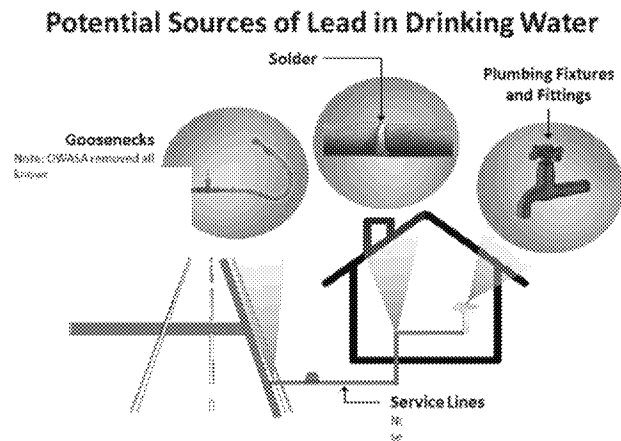
Too much copper can cause adverse health effects, including stomach cramps, nausea. It has been associated with liver and kidney damage.

The human body has a natural mechanism for maintaining proper levels of copper, but children under 1 have not yet developed this mechanism and are much more vulnerable to toxic effects of copper.

People with Wilsons disease also need to limit exposure.

Why are some systems are more vulnerable?

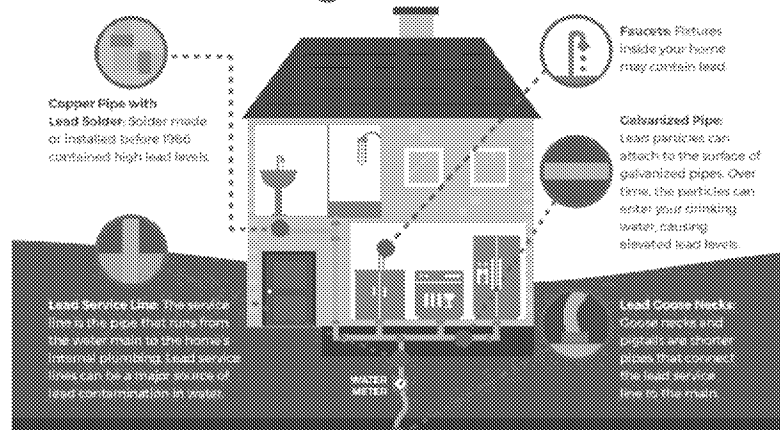
1. Lead Service Lines in distribution system
2. Corrosive water sources
3. Household plumbing





CONCERNED ABOUT LEAD IN YOUR DRINKING WATER?

Sources of **LEAD** in Drinking Water



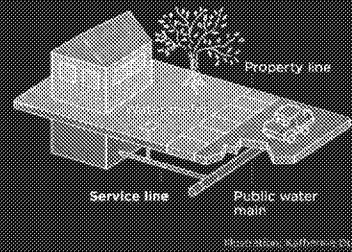
NPR – online App

What's a service line?

When lead gets into tap water, it often happens right before it enters the home — through what is called a service line.

Service lines are like straws that carry water to your house from the main. Often, the **part up to the property line** is considered public, and may have been replaced by the water utility. But in a lot of cities, **most of the service line** is considered private property — and the homeowner's responsibility.

Service lines can be pure lead. If they aren't made of lead, they might be soldered together with lead.



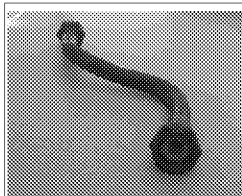
To find out what your service line is made of, you'll need a refrigerator magnet, and a key or a coin.

[Next: Find your water meter](#)

[Back](#)

Lead Gooseneck and Pigtails – What Are They?

What is a “Lead Gooseneck”?



*Photo of a lead gooseneck removed from the system.
Note the protection coating on the inside of the
gooseneck from SPW's corrosion control strategy.*

2-foot section of lead
pipe that connects to
the water main

Flexible to allow
movement between the
main and galvanized
service line



Why are some water sources corrosive?

- Surface water is a particular concern
- Switching back and forth between GW and SW is a concern

Fresno example

<http://www.fresnobee.com/news/local/article151060437.html>

<http://www.fresnobee.com/news/local/article103813056.html>

<http://www.fresnobee.com/news/local/article101653487.html>

Over 2, 000 complaints in the course of 2016/2017 year of discolored water.

Over 160 homes with galvanized pipes had levels above 15 ppb.

Switched from groundwater to Treated Surface Water in 2004. Between 2004 and 2016 the City received about 150 color complaints per year that went unreported.

Northeast Fresno.

***reminder to let us know if you are getting complaints, we will try to help!

Source Fresno Bee 3/8/2017

The original rule: what was required?

- Replaced the previous standard of 50 ppb at the entry point to distribution system for lead.
- Must complete two consecutive 6-month Standard Monitoring Periods with no exceedances, to qualify for reduced monitoring
- Reduced Monitoring Frequency

90 th percentile (Pb < 5 ppb, & Cu < 0.65 ppm)	90 th percentile below action level but (Pb > 5 ppb & Cu > 0.65 ppm)
Sample every 3 years	Sample every 2 years

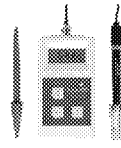
- Notification

Two weeks to the Rule along the way

- 2000 – Additions regarding corrosion control; requirements for lead service line replacements; more on public education; etc...
- 2004 – minor revisions
- 2007 – short term revisions
- Recent California updates:
 - Lab-to-State Portal to report results
 - Tap sampling results form (for customers)
 - Sampling Guidance document
- Revisions are currently under way (EPA White Paper 2016)
 - Issues being considered
 - 1. Sample site collection criteria
 - 2. Sampling protocol
 - 3. public education for copper
 - 4. Measures to ensure optimal corrosion control
 - 5. Lead service line replacement

Redding DDW Experience with the Lead and Copper Rule

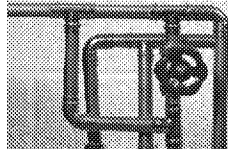
- Actual water quality issues have been mostly with copper, not lead, because of low pH water



- Misunderstanding of the sampling protocols - a major “wrench in the works” with this rule

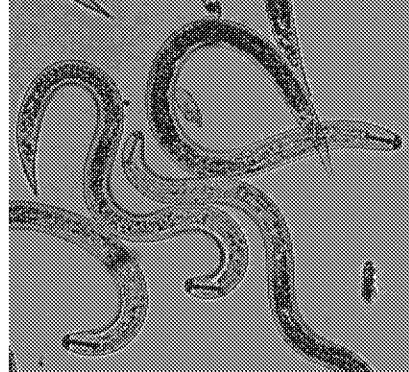


- We have seen issues with newer non-compliant internal plumbing that should not have happened



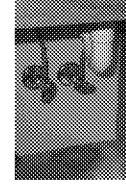
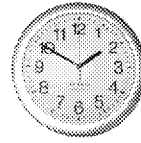
Low pH waters – The major cause – Nematodes!

- We don't think about these little critters much, but they are always there in soil. Just like humans, they inhale oxygen and exhale carbon dioxide. The carbon dioxide lowers the pH.
- Some wells in the Butte County foothills have pH values in the 5.6 to 5.8 range. This will attack copper pipe and cause a problem.
- Common solutions are to provide air stripping (to remove the carbon dioxide), or to add sodium hydroxide (caustic) to raise the pH.

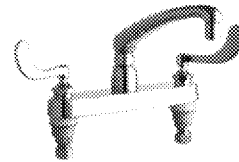


Not following the regulations or sampling protocols – recipes for “trouble”

- State regulations require a stagnation period of at least 6, but no more than 12 hours. Do not exceed the 12-hour maximum!
- The Yolo County Sheriff’s Detention Center shut off the angle stops under the sinks and then opened them just prior to sampling. This crushed scale and caused very high false positive results for lead.
- High Desert State Prison had many non-low lead faucets installed that were “smuggled in” from out of California. A great effort ensued to find and replace these outlaw faucets.



**Leave
These
Valves
Alone!**

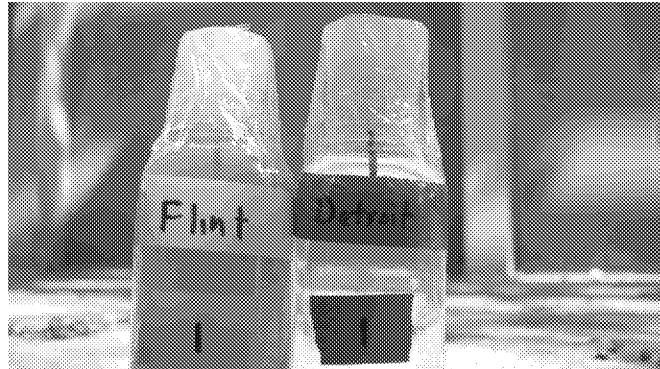


**Not Low
Lead As
Required!**

The Do's and Don'ts of Lead and Copper Sampling

- Do's
 - Collect samples in June, July, August, or September
 - Collect a cold water sample
 - Sample after water has stood undisturbed in pipes for at least 6 hours (i.e. in the morning)
 - 1 Liter Volume
- Don'ts
 - Collect a sample from a point of use device
 - Collect from a location that has limited use

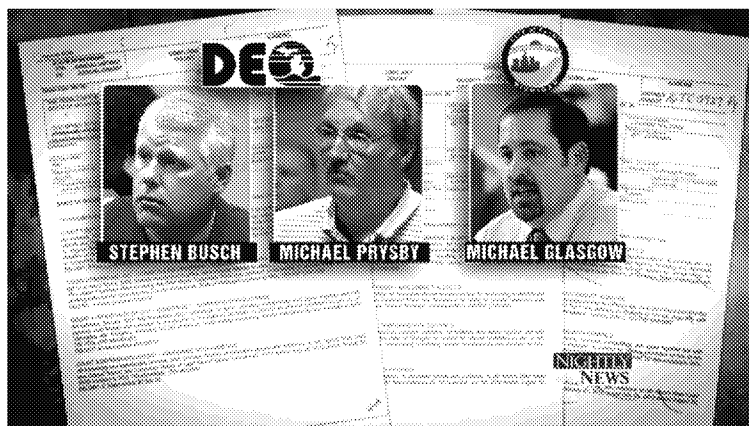
Flint, Michigan – The 2014 Water Crisis



What happened and Why

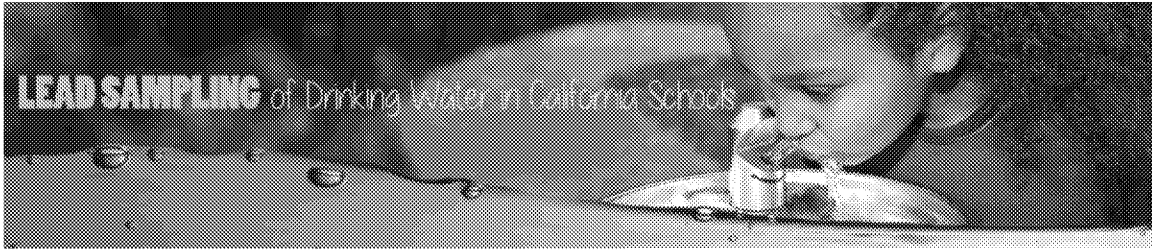


Criminal Charges Filed – Flint, Michigan



How Flint Affected the Rest of the Nation

- It's not just in Flint
- Lead testing in schools (Chicago/New York)



- January 2017 – Permit Amendments
 - as of November 2017, 1,829 schools requested that their water be sampled
 - 1,336 schools have submitted results
 - *Generally follows EPA's 3Ts Guidance but two major exceptions!*
 - 1. sample size (250 ml vs 1L)**
 - 2. 15 ppm vs 20 ppb**

3Ts recommends a sample size of 250 mL
We recommend 1 L

3Ts recommends water fountains or outlets be taken out of service if over 20 ppb
We recommend taking out of service and resampling if over 15 ppm.



October 13, 2017 - California Assembly Bill 746

-Section 116277 added to Health and Safety Code

Comparison of 2017 Permit Amendment and AB 764

	HS 112277	2017 Permit Amendments
Schools Affected	Includes school sites constructed before 1/1/2010	Includes K-12 schools that request sampling
Number of Samples	The minimum number of samples to collect at a school site is not specified	One to five samples from regularly used sinks, faucets, and fill stations
Timeline	Must be completed by 7/1/2019	During school year, within 90 days of receiving a request
Reporting Requirements	Report findings to school site within 10 business days after receiving results	Provide and discuss sample results with school site within 10 days of receiving results. Laboratories are requested to submit results to DDW database
Action Level	15 ppb action level	15 ppb action level
Field Action Requirements	All exceedances reported to school within 2 business days. Collect repeat sample at the water system/school site service connection	Notify school site of exceedances within 2 business days. Collect resample within 10 business days if site remains in service. Collect third sample within 10 business days after notification that resample is less than 15 ppb

DDW Recommendations

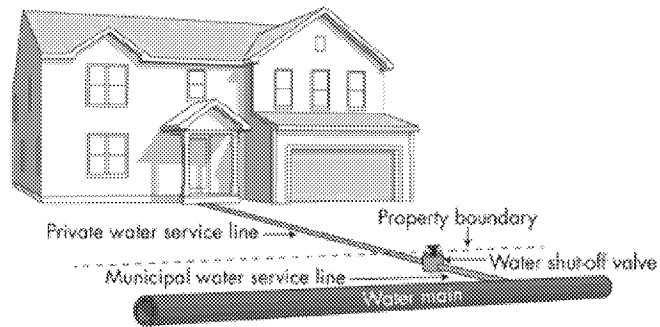
1. Community water systems and schools are encouraged to use the sampling guidance developed for the 2017 permit amendments to meet the sampling requirements in HSC 116277

2. Sample results from schools should be reported electronically to DDW through the DRINC Portals [School Lead Sampling and Reporting Tool](#).

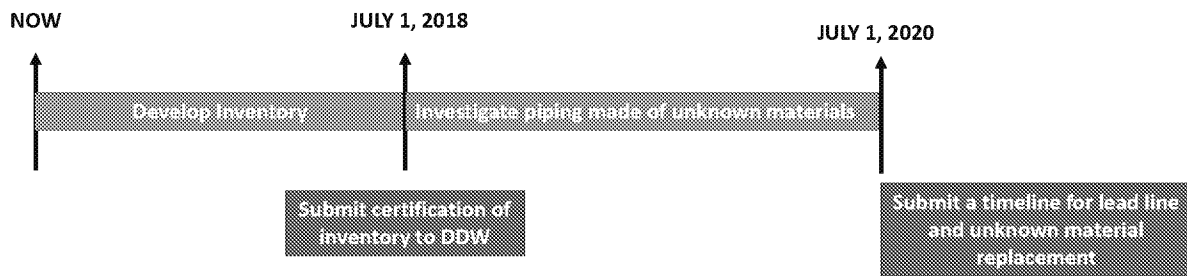


Lead Service Line Inventory

- SB 1398 – September 27, 2016 → HSC 116885
- SB 427 – September 11, 2017 → amend 116885 & add 116890



What is required?



Coming Soon...

